

Principle of operation of the "Biofon" devices»

During exposure, the device emits modulated electromagnetic waves of non-thermal intensity in the near-IR range of 0.7-0.8 microns (99% of the radiated power) and polarized electromagnetic waves in the range of 3-10000 microns (less than 0.1% of the radiated power), the radiation spectrum of which is identical to the radiation spectrum of inactivated strains of pathogenic microorganisms.

Under the influence of polarized IR radiation, pathogenic microorganisms are inactivated due to conformational changes in specific proteins embedded in the plasma membrane, as a result of which the locking transmembrane potential E_{zap} is established on the plasma membrane of pathogenic microorganisms., the activity of biochemical processes in the microbial cell decreases and its protective functions are weakened. Complete release of the macroorganism from the above groups of pathogenic strains occurs as a result of their active displacement by the commensal microflora and intensive elimination of pathogenic strains by elements of the immune system.

As a clear example, Figure 1 shows a graph of the dependence of changes in the activity of the *Staphylococcus aureus* strain (the potential on the bacterial plasma membrane was measured by a field remote method, by analyzing the state of physical fields formed in space by a colony of similar cells) in the patient's body and the dynamics of changes in colony-forming units (CFU/ml) seeded from the urethra after a course of IR therapy with the Uro-Biofon device in a slow-moving inflammatory process with a diagnosis of non-specific urethritis. This patient was treated for four sessions a day for three days. As can be seen from the figure, this patient experienced complete elimination of *Staphylococcus aureus* from the urethra 50 hours after the start of physiotherapy treatment.

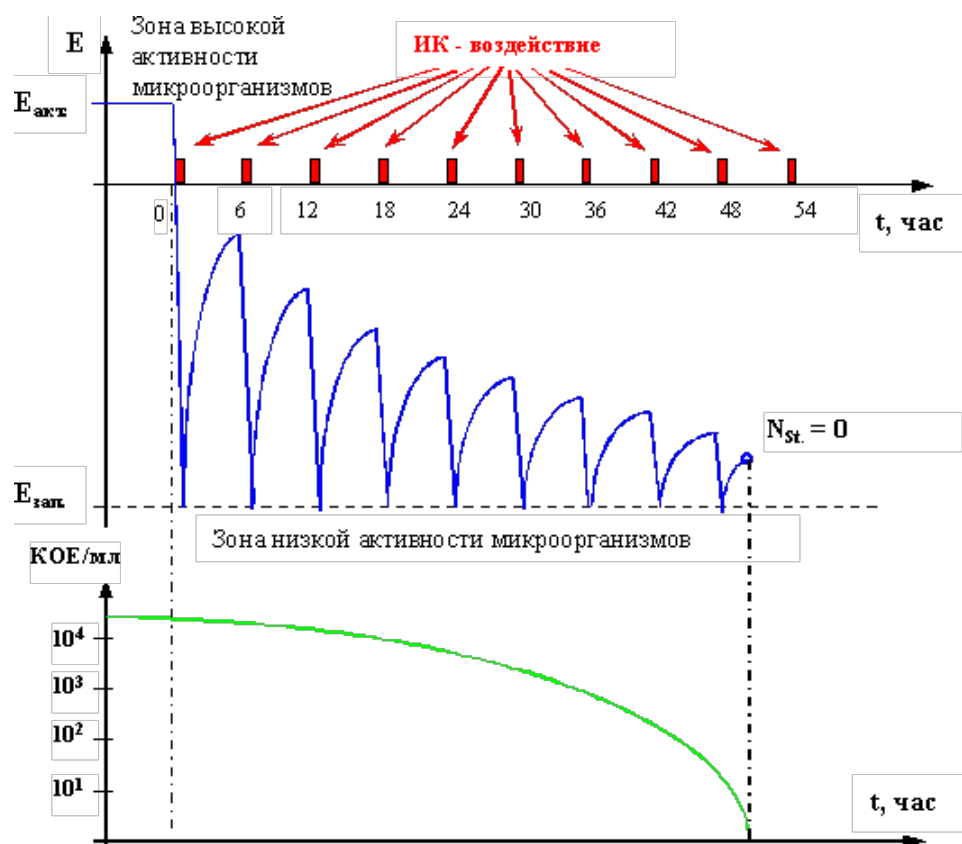


Рис.1 а) График изменения активности *Staphylococcus aureus* после серии сеансов ИК - воздействия аппаратом "Уро-Биофон" при вялотекущем воспалительном процессе вплоть до полной его элиминации в организме человека, б) график изменения колониеобразующих единиц (КОЕ) после серии сеансов ИК - воздействия аппаратом "Уро-Биофон"

Graph of changes in the activity of the Staphylococcus aureus strain

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The duration of a therapeutic session of IR therapy with the URO-BIOFON device is constant and is only 24 seconds, the frequency of sessions in each specific case is determined by the attending physician depending on the nature of the inflammatory process and can range from 48 sessions per day to 1 session for 2-3 days (an average of 3-6 sessions per day). It is necessary to choose such a schedule of sessions that during the entire period of treatment to keep the strains of pathogenic microorganisms in an inactive state. Complete release of the body from the above-mentioned pathogenic microorganisms, if the treatment method is followed, occurs in more than 98% of cases. The duration of treatment of infected patients with pronounced immunodeficiency can be increased up to 10 times.

However, clearing the body of one or more strains of pathogenic microorganisms of any kind at the first stages of treatment may even reduce the body's resistance to secondary colonization with similar strains of pathogens of the same kind, since the colonization resistance of commensal microorganisms that prevent colonization with pathogenic strains remains low, and the spectrum of their varieties is not wide enough.

To increase the resistance of the human body to secondary colonization by pathogenic microorganisms, for example, staphylococci, it is necessary to restore the commensal microflora of this genus, for which it is necessary to free the macroorganism from pathogenic microorganisms that suppress the activity of commensal staphylococci. Therefore, in the process of operation, the Biofon device inactivates not only pathogenic strains of staphylococci and their toxins, but also pathogenic strains of bacteria, viruses, fungi, prions, single-celled protozoa (and their toxins), which suppress commensal staphylococci, thereby restoring the activity and, over time, the number of existing commensal strains of staphylococci. Figure 2 shows the principle of operation of the Uro-Biophon device on the example of the Staphylococcus genus.

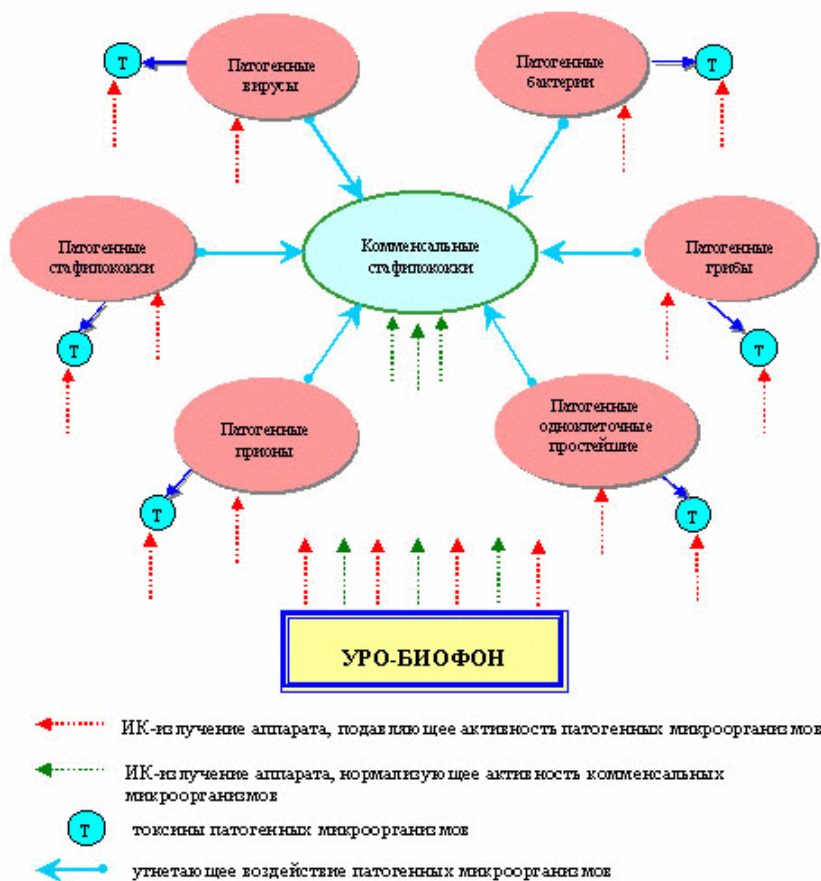


Рис.2 Объекты ИК-воздействия аппарата "Уро-Биофон" на примере рода *Staphylococcus*.

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The degree of population of an organism with certain strains of any genus or family of microorganisms can be characterized by the value, which is determined by the formula:

$$S = N / M$$

where: N is the number of varieties of commensal strains of any genus that populate a given organism; M is the maximum number of varieties of commensal strains of any genus that can populate the human body.

The average process of restoration of the commensal microflora of the genus *Staphylococcus* with different degrees of population of the macroorganism by commensal staphylococci in three different patients is shown in Figure 3 with population rates $S_{ini} = 10\%$, 50% and 90% .

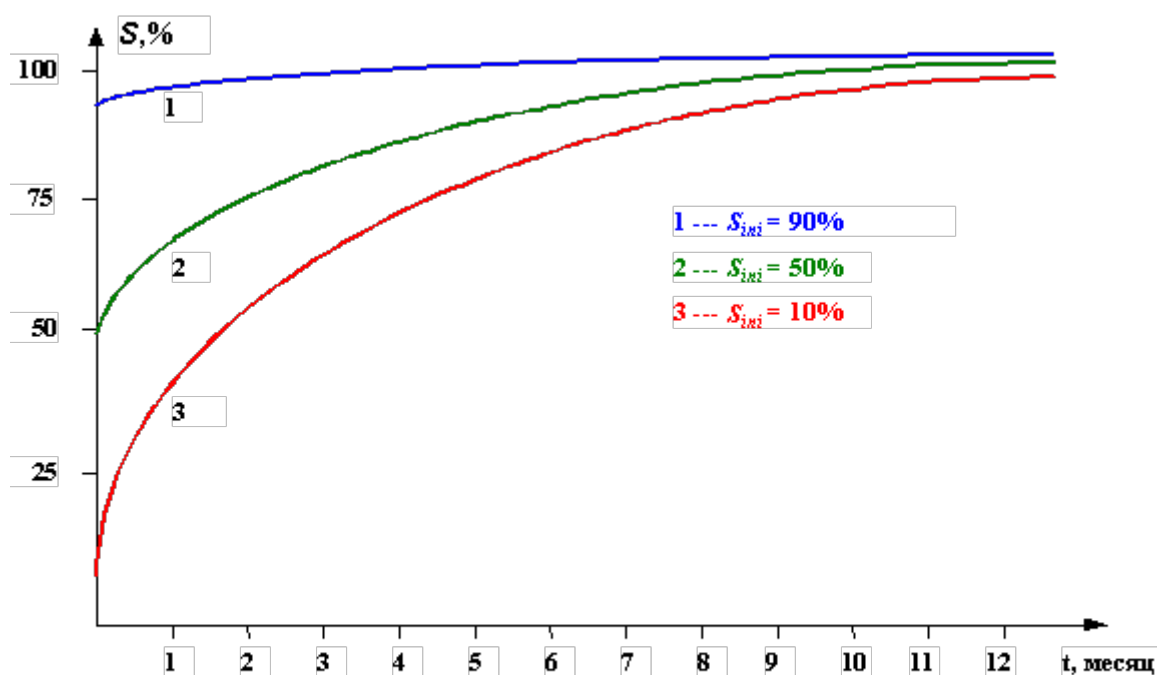


Рис.3 Идеализированные графики восстановления штаммов рода *Staphylococcus* $S = f(t)$ при различных начальных уровнях заселенности S_{ini} .

The recovery time of any kind of commensal microflora can vary quite widely, from one month to two years, depending on the state of the commensal microflora of this kind in the human body, on the patient's age, the effectiveness of the functioning of his body, on the degree of dominance of the commensal microflora in food over pathogenic (especially in meat and dairy products), on the ecological situation, as well as on the patient's social circle.

Figure 4 shows schematic data illustrating the operation of the URO-BIOFON device in terms of changing both the activity and the number of varieties of commensal and pathogenic strains of any kind of microorganisms in stages during the treatment period. For clarity, the radiation spectrum of each strain is shown as a separate spectral line located on the "X" axis, and the potential on the plasma membrane E (and the corresponding metabolic activity) on the "Y" axis.

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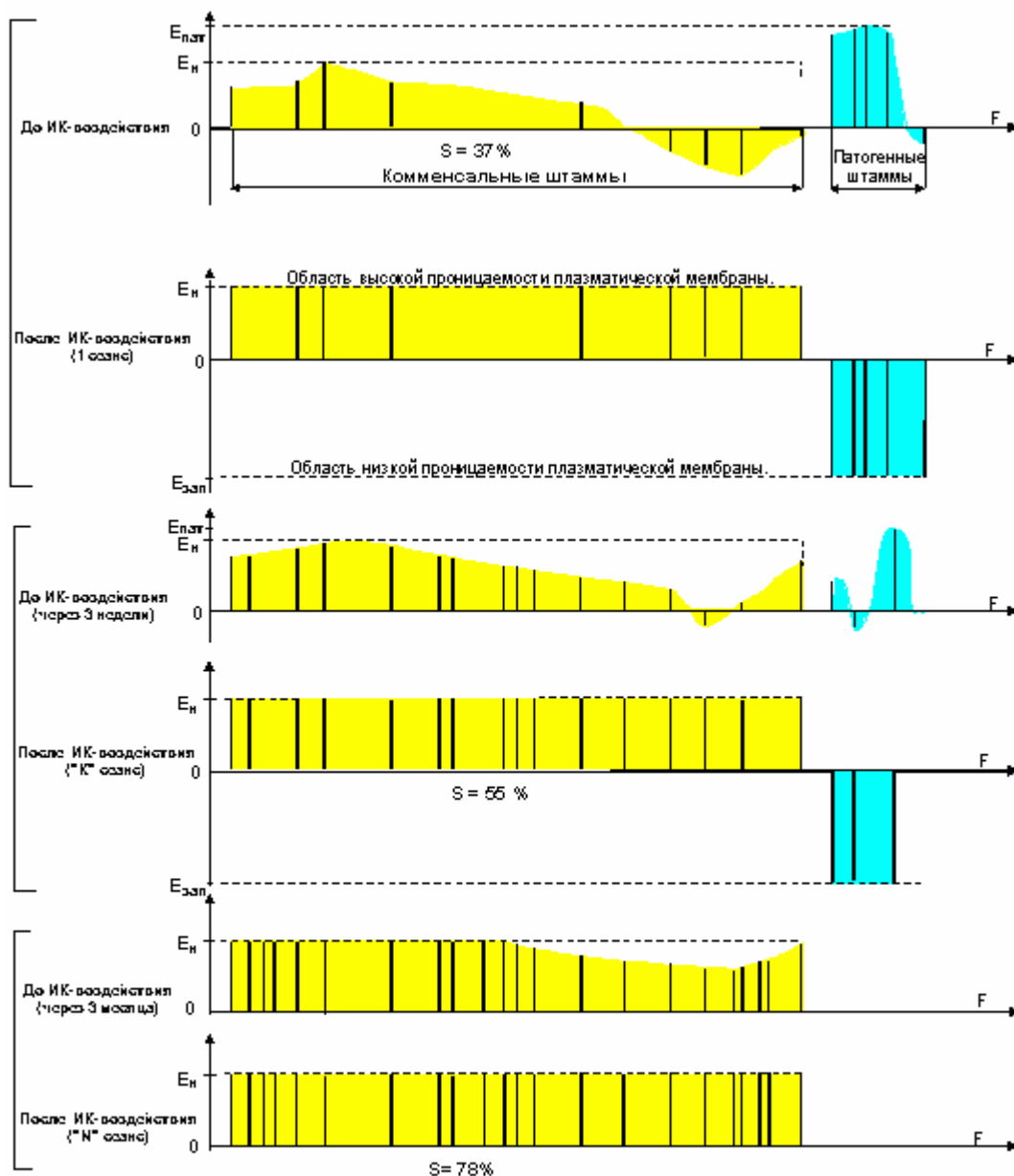


Рис. 4 Графики изменения активности комменсальных и патогенных штаммов какого-либо рода в организме человека до и после воздействия аппаратом "УРО-БИОФОН" позитивно в течение лечения.

It should be taken into account that the transmembrane potential of pathogenic microorganisms is low. It can vary widely and significantly exceed the transmembrane potential of normal cells, while the transmembrane potential of commensal microorganisms does not. It cannot exceed the normal transmembrane potential of mammalian cells.

E-mail address. $\leq E_n$.

3) shows that in the course of treatment with the URO-BIOFON device, pathogenic strains of any kind are eliminated ($N_{pat.} \rightarrow 0$), the activity of commensal strains of this genus is normalized ($E_{com.} \approx E_{is\ normal.}$), the number of varieties of commensal strains increases to the norm ($N_{com.} \approx M$) and the degree of population increases ($\rightarrow 1$).

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The results of 1865 in vitro experiments on the IR effect of the URO-BIOFON device on various representatives of the Mycobacteriaceae family, including virulent strains M. H37Rv, M. bovinus-8, and M. avium; avirulent strains M. H37Ra, and saprophytic strains M. smegmatis are presented in the table.

Strains of the Mycobacteriaceae family	Slowing down the growth rate, (%)	Increasing the growth rate, (%)	Reduction of microbial mass yield, (%)	Increase in microbial mass yield, (%)
M. H37Rv (pathogenic)	75	-	45	-
M. Bovinus-8 (pathogenic)	85	-	52	-
M. Avium (pathogenic)	60	-	37	-
M. H37Ra (avirulenny)	-	15	-	28
M. Smegmatis (cad suite)	-	166	-	173

As follows from the data shown in the table, along with the inhibition of the growth of virulent laboratory strains, an increase in the growth rate of avirulent strains of M. H37Ra by 15% and saprophytic strains of M. Smegmatis by 166% is noted.

The results of clinical trials for the treatment of tuberculosis in the Sverdlovsk Regional Scientific and Practical Association "Phthisiopulmonology" (SONPOF) and in the Republican Clinical Tuberculosis Hospital of Izhevsk (RKTБ) are shown in Figure 5. The effectiveness of treatment of patients with respiratory tuberculosis was evaluated on the basis of a set of signs: the speed of disappearance of intoxication symptoms, X-ray dynamics of pulmonary changes, and the timing of abacillation. As can be seen from the above graphs, abacylation of bacterial excretors occurs much faster when using the URO-BIOFON device than in the control groups with standard tuberculostatic therapy.

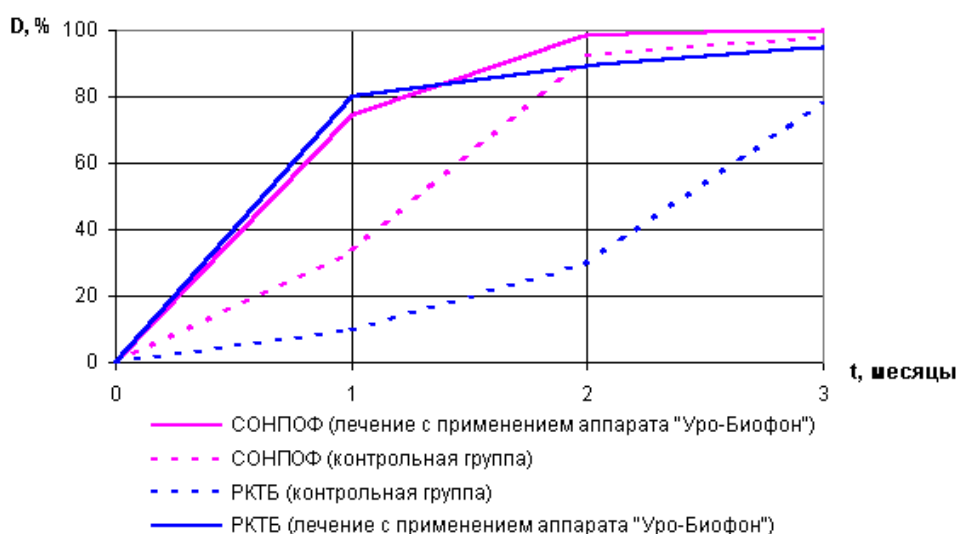


Рис.5 Динамика абацилирования бактериовыделителей.

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Results of clinical trials for the treatment of tuberculosis

Thus, experiments conducted in vitro and in vivo clearly demonstrate the principle of operation of the URO-BIOFON device, its high selectivity and efficiency in comparison with other known methods of influencing pathogenic microorganisms.

The principle of operation of the device "BIOFON" is described in detail in the patent of the Russian Federation No. 2055604 "Device for changing the activity of a living cell".